

## SECTION 1-2

## SECTION SUMMARY

## Phases, Eclipses, and Tides

Guide for  
Reading

- ◆ What causes the phases of the moon?
- ◆ What causes solar and lunar eclipses?
- ◆ What causes the tides?

**A**s the moon moves, the positions of the moon, Earth, and the sun change in relation to each other. **The positions of the moon, Earth, and the sun cause the phases of the moon, eclipses, and tides.**

The moon revolves around Earth about once every 27.3 days. It also rotates on its own axis about once every 27.3 days. The same side of the moon always faces Earth. The different shapes of the moon you see from Earth are called **phases**. Phases are caused by changes in the relative position of the moon, Earth, and sun. **The phase of the moon you see depends on how much of the sunlit side of the moon faces Earth.**

**When the moon's shadow hits Earth or Earth's shadow hits the moon, an eclipse occurs.** An **eclipse** occurs when an object in space comes between the sun and a third object, and casts a shadow on that object. There are two types of eclipses: solar and lunar.

A **solar eclipse** occurs when the moon passes between Earth and the sun, blocking the sunlight from reaching Earth. The moon's shadow then hits Earth. The darkest part of the moon's shadow is called the **umbra**. From any part of the umbra, the moon completely blocks light from the sun. Only people in the umbra see a total solar eclipse. Another part of the shadow is less dark and larger than the umbra. It is called the **penumbra**. From within the penumbra, people see a partial eclipse, because part of the sun is still visible.

A **lunar eclipse** occurs at a full moon when Earth is directly between the moon and the sun. During a lunar eclipse, Earth's shadow falls on the moon. Earth's shadow also has an umbra and a penumbra. When the moon is completely within Earth's umbra you see a total lunar eclipse. A partial lunar eclipse happens when the moon moves into Earth's penumbra.

**Tides** are the rise and fall of the ocean's water every 12.5 hours or so. The force of **gravity** pulls the moon and Earth toward each other. **Tides occur mainly because of differences in how much the moon pulls on different parts of Earth.** As Earth rotates, the moon's gravity pulls water toward the point on Earth's surface closest to the moon. The moon pulls least on the side of Earth farthest away. Two tides occur each day because of this difference in the pull of the moon's gravity.

Twice a month, the moon, Earth, and the sun are in a straight line. The combined forces of the gravity of the sun and moon produce an especially high tide—called a **spring tide**—and an especially low tide. Also twice a month, the pull of gravity of the sun and moon are at right angles to each other. At those times the high tide is lower than usual, and is called a **neap tide**. The low tides then are higher than usual.

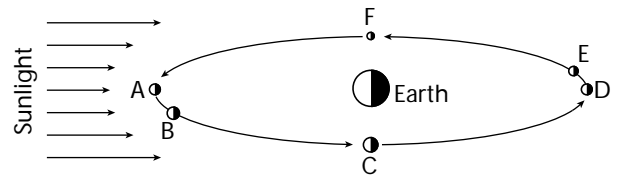
**SECTION 1 - 2****REVIEW AND REINFORCE**

# Phases, Eclipses, and Tides

## ◆ Understanding Main Ideas

Use the following figure to answer questions 1 and 2. Write your answers on the back of this page or on a separate sheet of paper.

1. What phases of the moon would someone on Earth see when the moon is at positions A through F?
2. What kind of tide will occur when the moon is at positions A, C, D, and F?



## ◆ Building Vocabulary

From the list below, choose the term that best completes each sentence.

phase	tides	gravity	lunar	penumbra
eclipse	umbra	spring	solar	neap

3. A(n) \_\_\_\_\_ tide occurs when the sun is at right angles to the line between Earth and the moon.
4. A(n) \_\_\_\_\_ occurs when the moon's shadow hits Earth or Earth's shadow hits the moon.
5. A person standing in the moon's \_\_\_\_\_ would see a partial solar eclipse.
6. Differences in the moon's pull on different parts of Earth cause \_\_\_\_\_.
7. A person standing in the moon's \_\_\_\_\_ would see a total solar eclipse.
8. The \_\_\_\_\_ of the moon you see depend on how much of the sunlit side of the moon faces Earth.
9. A(n) \_\_\_\_\_ tide occurs when the sun, moon, and Earth line up.
10. A(n) \_\_\_\_\_ eclipse occurs at a full moon when Earth is directly between the moon and the sun.
11. A(n) \_\_\_\_\_ eclipse occurs when the moon passes between Earth and the sun.
12. The force of \_\_\_\_\_ pulls the moon and Earth toward each other.